DRAINAGE CHANGES IN THE VICINITY OF LOUDONVILLE, OHIO.

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INTRODUCTION.

In a previous number of the Ohio Journal of Science[1] the writer gave reasons for believing that the preglacial drainage from Wooster was southward toward Shreve instead of eastward toward Orrville, as postulated by Todd.[2] Obviously, if the waters could not escape by a route to the eastward they must have flowed either to the south toward the Walhonding or northward toward Lake Erie. In this paper an attempt is made to find an exit for the extensive drainage system called by Dr. Todd, the Old Mohican.

The writer takes this opportunity to give credit to other workers in this area, Leverett, Hubbard, Conrey and Coffey, all of whom have made contributions to the drainage and glacial problems.

PREGLACIAL DRAINAGE.

In preglacial time a major divide extended in a northwesterly direction through Ohio, from a point in western Belmont County, through northeastern Guernsey, Tuscarawas and Holmes counties and extreme southern Ashland and Richland counties. This divide separated the drainage leading northward toward the Lake Erie basin and the drainage to the south which led westward past Buckeye Lake. The area discussed in this paper lies to the north of the above mentioned divide.

Examination of the Loudonville quadrangle reveals the existence of a broad valley which extends from Loudonville to Wooster. This valley, now followed by the Pittsburgh and Fort Wayne Division of the Pennsylvania Railroad, was

[1]Ver Steeg, Karl. Drainage Changes in the Vicinity of Wooster, Ohio. Ohio Journal of Science, Vol. 30, No. 5, September, 1930.

[2]Todd, J. H. Some Observations on the Preglacial Drainage of Wayne and Adjacent Counties. Ohio State Academy of Science, Special Papers, No. 3, pp. 46–67, December, 1900.

occupied by a large stream in preglacial time. Todd, who called it the Old Mohican, traced it from Mansfield to Loudonville and Shreve, where its course he believed was northeastward to Wooster, from which point he assumed it extended across a broad divide to Orrville, where it presumably followed the old valley now occupied by Little Chippewa Creek, taking a northwesterly course, leaving Wayne County north of Sterling. From this location he believed its channel led northward by way of Chippewa Lake and into the valley of the West Branch of the Rocky River. The objection to this route appears to be that there is no evidence of the existence, in preglacial time, of a channel across the divide between Wooster and Orrville.[3] Therefore it is necessary to find another course by a different route. It has been suggested that the stream may have flowed south by way of the Killbuck valley into the Walhonding. But there are good reasons why this could not have been its course. The evidence appears quite convincing that the major divide, mentioned above, crosses the present course of Killbuck Creek near the town of Killbuck. This watershed was high, 1,300–1,400 feet above sea level in many places, separating the streams in the basin now occupied by the Tuscarawas and Walhonding rivers and which had its outlet to the west, from the streams which flowed northward to the Erie basin. The divide continues westward to a point south of Nashville and from there to a position west of Spellacy, extending between the tributaries of the Clear Fork, flowing northward and those flowing south into the Kokosing River. In preglacial time this divide separated a stream, now the lower Killbuck, flowing southward and another flowing northward into the large stream which occupied the valley from Wooster to Shreve. There is further evidence which seems to favor the above conclusion; the Killbuck valley narrows markedly in the direction in which the stream flows and is narrowest at the col near the village of Killbuck, where the water was forced over the divide as a result of damming by glacial action to the north. The tributaries which flow into this portion of the Killbuck, from Kauke to the col, flow into the trunk stream at an angle normal for a stream flowing north. South of the col, the tributaries of the Killbuck are normal for a stream which flowed southward in preglacial time. This part of the Killbuck widens gradually to

[3]Ibid. 1, pp. 309–314.

the south, being widest where it enters the Walhonding River. It appears conclusive to the writer that the Old Mohican did not flow southward by way of the valley of the Killbuck. The drainage must necessarily have been northward from the major divide toward the Lake Erie basin. The waters could

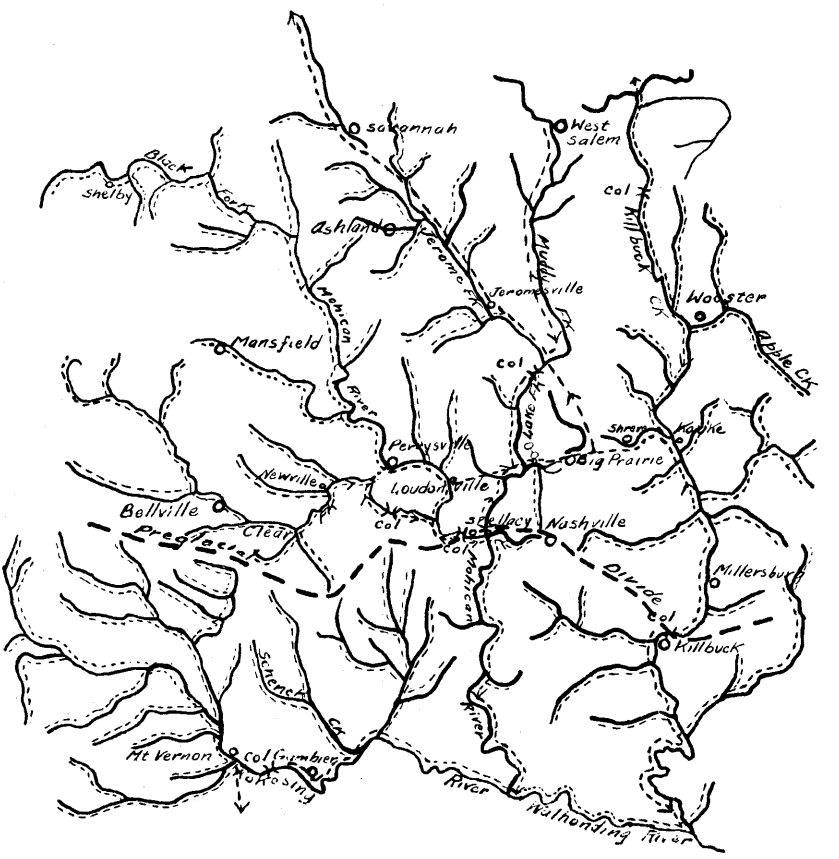

FIG. 1. Sketch showing drainage changes; dotted lines indicate the preglacial drainage.

not escape across the divide between Wooster and Orrville, nor through the upper Killbuck valley occupied by the Baltimore and Ohio Railroad; in the first instance bed rock completely shuts off the exit and in the latter case the Killbuck valley widens southward from a point between Armstrong and Overton, where a preglacial col existed, indicating that this valley was occupied by a tributary which flowed south-

ward. The only outlet for the waters was by way of the broad valley which extends northward from Big Prairie and Custaloga. The most logical route northward is the valley of the Jerome Fork. It does not narrow to the north as the one to the east occupied by Muddy Fork which is much narrower than the Jerome Fork valley. It is evident that Muddy Fork valley in preglacial time was the site of a stream which flowed south. The greatest objection to the northward route by way

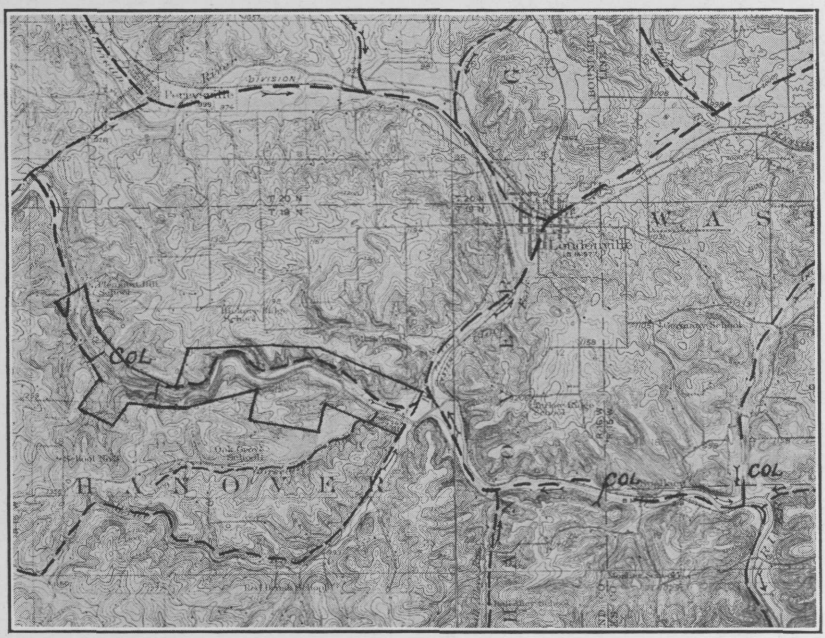

FIG. 2. Map showing the direction of the preglacial drainage, the position of the cols and the location of the Mohican Park.

of Jerome Fork valley seems to be the angle at which it meets Muddy Fork. It is such as to indicate that the two streams joined west of Blachleysville and flowed south into the Old Mohican at Custaloga. But the fact that the Muddy Fork valley has a trend contrary to what one would expect if the main stream flowed north in Jerome Fork valley is not fatal to the argument. The trunk stream appears to have flowed northwestward past Jeromesville and Savannah and from there by way of the Vermilion River valley. Because the exit of the waters is shut off everywhere except by this route, seems to the writer to be the best argument for such a course.

Southwest of Perrysville there appears to be a broad preglacial valley about a mile long, filled with glacial drift. Doubtless this was the preglacial course of the Clear Fork of the Old Mohican. In T. 19 N. and R. 16 W., sections 8 and 17 in Mohican Park there existed a divide, which separated a tributary to the Clear Fork from another flowing eastward to what is now part of the Black Fork. This divide was higher than 1,300 feet above tide at some distance north and south of the col. An examination of the map and study in the field shows that the Clear Fork, from a point southwest of Perrysville, flows in a valley which narrows in the direction of flow, an abnormal condition, explained only by reversal as a result of glacial damming. To the east of the col, the Clear Fork valley widens perceptibly until it reaches the junction with the Black Fork, where it is more than a quarter of a mile wide.

At this point it might be well to digress for a few moments and discuss the features of the State Park. This area outlined on the map by State Forester Edmund Secrest, is one of the most interesting from the standpoint of both Geology and scenery. It is one of the recent additions to the state forest reserve, containing a purchase area of approximately 1,500 acres, of which 850 acres have already been acquired by the state. It is the opinion of the writer that no more beautiful park area exists in Ohio. There is much to remind one of the mountain regions of the west, where below timber line occur various species of coniferous trees. Hemlocks, pines and hardwoods grace the steep sides of the narrow, canyon-like valley, through which flows the Clear Fork, a clear, swiftly flowing stream. The gorge, near the col, is a fine example of a youthful valley, about 320–340 feet deep and approximately a quarter of a mile wide across the top at its narrowest point, tapering down to a width of about 200–300 feet at the bottom. Other features of youth are the steep sides with bold rock outcrops, forming prominent cliffs, typical V-shape, overlapping spurs, swiftly flowing stream with clear water and small rapids, indicating that it is still deepening its valley. On the outside of the bends are present steep, undercut slopes with characteristic cliffs and on the inside the more gently inclined slip-off slopes. Above and below the col the valley widens and flood plain scrolls make their appearance. At the point where the Clear Fork and Black Fork meet, the valley is quite wide, possessing a flood plain of considerable breadth. The

same is true of the valley of the Clear Fork southwest of Perrysville, where the gorge begins. The youthful appearance of the valley is in harmony with the theory that a divide existed here in preglacial time through which has been cut the narrow, post-glacial gorge which lies within the boundaries of the park.

About a half mile or more west of Spellacy (Loudonville Quadrangle) there existed in preglacial time, a divide separating a tributary which flowed westward and another flowing eastward into the Mohican River. From the junction of the Clear Fork and Black Fork the Mohican River flows eastward in a valley

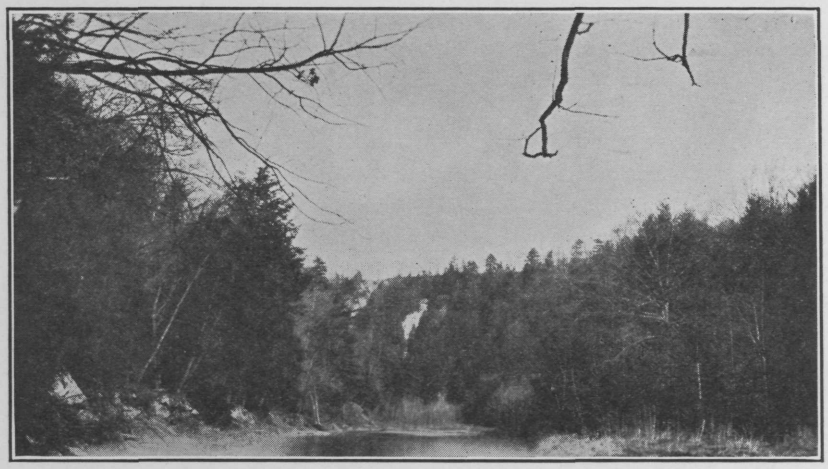

FIG. 3. View of the Clear Fork gorge in Mohican Park.

which narrows until it reaches the col, west of Spellacy; to the east of the col the Mohican valley widens to the south. Lake Fork, coming from the north, flows in a valley which narrows markedly until it reaches a point about three-quarters of a mile north of its junction with the Mohican River. This position marks the preglacial divide between a short tributary to the Mohican and another flowing northward into the trunk stream which flowed from Loudonville to Big Prairie and northward. The upper Lake Fork occupies, in part of its course, what appears to have been the valley of a tributary which flowed south into the trunk stream. At Loudonville a tributary, now part of Black Fork, flowed northward and joined the main stream. This tributary had other branches, one flowing east from the Clear Fork col and another flowing

west from the Spellacy col, and two others, Horsetail Run and Pine Run.

The reversion of drainage from north to south may have occurred during an invasion of the ice, earlier than the Illinoian. There appears to be no evidence of an earlier invasion than the Illinoian, but that fact does not exclude the possibility.

Leverett's map[4] shows the edge of the Illinoian drift extending northward parallel to the Mohican and a few miles east of it, disappearing beneath the Wisconsin drift to the west of the town of Nashville. The late Wisconsin drift border extends from a point near Newville to Loudonville, and south of Nashville to a position south of Millersburg and eastward. During the Illinoian glaciation the whole of the Mohican River and the area about Loudonville was covered by the ice. During the late Wisconsin the ice edge stood from Newville to a point south of Loudonville where the Lake Fork joins the Mohican River, indicating that the late Wisconsin ice did not cover the State Park portion of the Clear Fork gorge. There is a decided contrast in topography between the area covered by Illinoian drift and that covered by the later till; the cycle of erosion is farther advanced in the case of the former. In the State Park area there appears to be little evidence of late Wisconsin glaciation. Therefore it would seem that it was either during the Illinoian or an earlier epoch of glaciation that the drainage was here reversed. Between the two epochs there was much erosion. If the deep gorge in the park, at the col, was cut during and since Illinoian time it is not unreasonable to assume that many of our deep valleys in southeastern Ohio could be post-Illinoian in age. During the long interval between the Illinoian and Wisconsin glaciations the drift may have been removed from the preglacial valleys and further deepened by erosion. Coffey[5] in his paper remarks, "practically all the deep valleys in the northeast section of the state, and probably in other sections as well, are of interglacial or postglacial origin." Although the writer does not agree in full with this statement, it is clear that we must assign a great amount of erosion to interglacial time. If each advance of the ice caused changes in the drainage, it stands to reason that the present drainage lines may in some cases bear little or no relation to the drainage in preglacial and interglacial time.

[4]U. S. Geol. Survey Monograph XLI, Plate XIII.

[5]Coffey, G. Ohio Journal of Science, Vol. XXX, November, 1930, p. 374.

As the ice advanced during Illinoian time or earlier, lakes were formed between the major divide to the south and the ice to the north. The water rose until it was forced over the divide located between the towns of Millersburg and Killbuck. The broad valley of the trunk stream which leads from Perrysville to Loudonville was occupied by the glacier, blocking the drainage to the north, in consequence of which the waters were forced to take a southerly route over the divides at the State Park and at Spellacy and by way of the Mohican River. During interglacial time which followed the Illinoian the valleys were in large part cleared of their drift deposits. If the

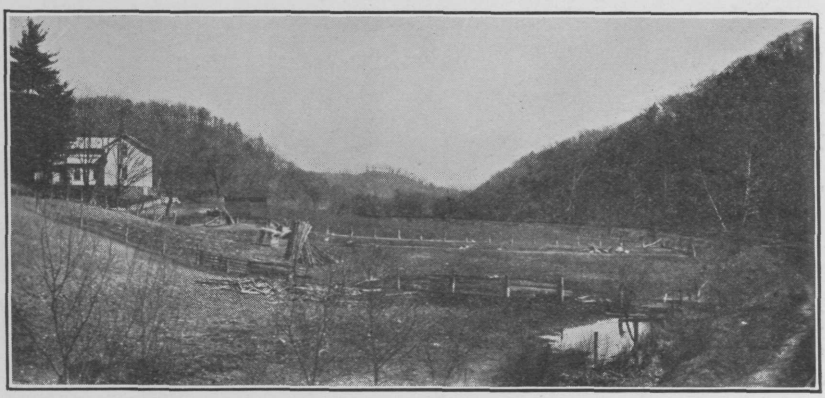

FIG. 4. View of the col, west of Spellacy.

reversion took place in Illinoian time or earlier, the waters of the Wisconsin glacier must have passed through Clear Creek gorge. What glacial debris (outwash) has been laid down in the gorge during Wisconsin time has been largely removed. Terraces occur in the valley of the Mohican River; their elevation appears to be about 960–980 feet above sea level. The gorge of the Mohican River, before the Wisconsin epoch, in interglacial time, may have been as deep as it is at present. This would be in accordance with what is known to be true at other localities in Ohio where evidence is sufficient to prove the excavation of deep valleys in interglacial time.

During the retreat of the late Wisconsin ice, several elongate lakes were formed. These have been called the Finger Lakes of Ohio by Professor Hubbard,[6] of Oberlin. One of them, called

[6]Hubbard, George D. Ancient Finger Lakes in Ohio. Amer. Jour. of Sci., Series 4, Vol. 25, 1908.

Lake Killbuck, was formed by the damming of the Killbuck valley near Holmesville by a moraine. This lake extended northward beyond Wooster and was finally drained by the lowering of the outlet located in the morainal dam. The broad flat of the Killbuck valley with its extensive swamp lands and muck deposits represents the poorly drained floor of Lake Killbuck. Another large lake produced by glacial damming during the retreat of the Wisconsin ice extended from the broad valley at Big Prairie and Custaloga to West Salem. Morainal deposits in the valley from Lakeville to Shreve formed a very effective barrier to the exit of the lake waters. The outlet of this body of water, called Lake Craigton, was by way of Lake Fork, a tributary of the Mohican River. As the late Wisconsin ice sheet receded, recessional moraines were formed. Leverett[7] shows three distinct morainic belts extending in an east-west direction in Wayne and Holmes counties. The two southernmost ones coalesce in the vicinity of Loudonville and Nashville.

CONCLUSION.

A preglacial divide existed between Millersburg and Killbuck, shutting off the escape of the waters of the Old Mohican to the south. The only possible exit for the drainage was by way of the broad valley past Jeromesville and northward past Savannah to the Vermilion River. The width and depth of the cols and the fact that the Illinoian glacier passed over a large part of the area seems to indicate that the reversion of drainage occurred during Illinoian time or possibly earlier, although no till of earlier age is present in the region. In interglacial time the Illinoian till was largely removed from the preglacial valleys, which were probably deepened by erosion. These valleys were subsequently filled with Wisconsin till and outwash deposits.

[7]Ibid. 1, pp. 423.